

CLAIMS

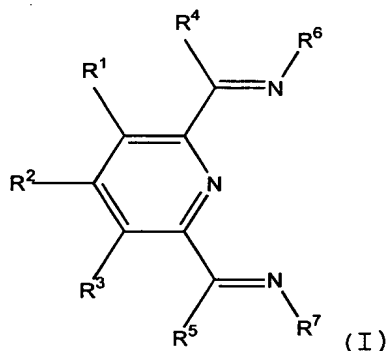
What is claimed is:

1. A process for preparing an olefin copolymer, comprising the step of contacting:

5 (a) a monomer component comprising ethylene and a diene of the formula $H_2C=CH(CH_2)_nCH=CHR^{19}$, wherein R^{19} is hydrogen or an n-alkyl containing 1 to 18 carbon atoms, and n is 0 or an integer of 1 to 28; and

(b) an active copolymerization catalyst,
10 under conditions to copolymerize the monomers of the monomer component, wherein the active copolymerization catalyst comprises an iron complex of a 2,6-pyridinecarboxaldehyde-bis(imine) or a 2,6-diacetylpyridinebis(imine).

15 2. The process as recited in claim 1, wherein the active copolymerization catalyst comprises an iron complex of a tridentate ligand of the formula (I)



wherein:

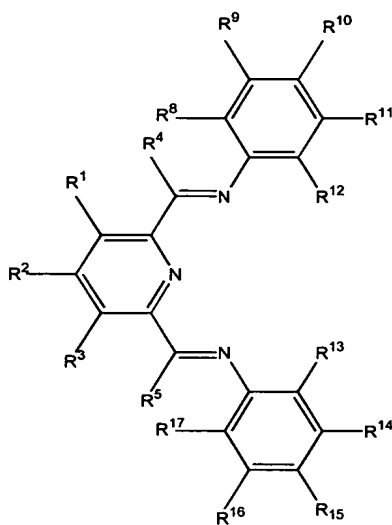
20 R^1 , R^2 , R^3 , R^4 and R^5 are each independently hydrogen, hydrocarbyl, substituted hydrocarbyl or an inert functional group, provided that any two of R^1 , R^2 and R^3 vicinal to one another, taken together may form a ring; and

R^6 and R^7 are each independently aryl or substituted
25 aryl.

3. The process as recited in claim 1, wherein the monomer component further comprises one or more α -olefins of the formula $H_2C=CHR^{20}$, wherein R^{20} is n-alkyl containing 1 to 18 carbon atoms.

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4. The process as recited in claim 1 wherein the active catalyst is an iron complex of a tridentate ligand of the formula (VII)



(VII)

wherein:

R^9 , R^{10} , R^{11} , R^{14} , R^{15} and R^{16} is each independently halogen, alkyl containing 1 to 6 carbon atoms, or hydrogen;

15 R^8 and R^{13} is each independently halogen, phenyl or alkyl containing 1 to 6 carbon atoms; and

R^{12} and R^{17} is each independently halogen, phenyl, hydrogen, or alkyl containing 1 to 6 carbon atoms.

20 5. The process as recited in claim 1, wherein n is 1, 2, 3, 4 or 6.

6. The process as recited in claim 5, wherein n is 1, 2, 3 or 4.

7. The process as recited in claim 1, wherein R¹⁹ is hydrogen or methyl.

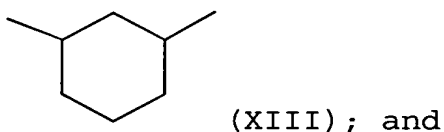
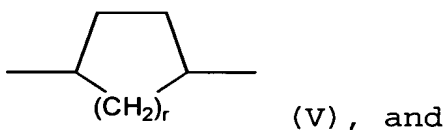
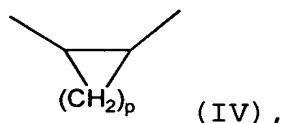
8. An olefin copolymer comprising the repeat units:

(a) $-\text{CH}_2\text{CH}_2-$ (II);

10 (b) $-\text{CH}-\text{CH}_2-$
|
 $(\text{CH}_2)_m\text{CH}=\text{CH}_2$ (III)

wherein m is 1, 2, 3 or 4; and

(c) (1) when m is 2, 3 or 4, one or more of



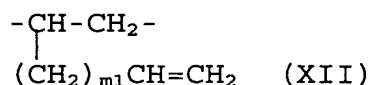
(2) when m is 1, one or more of (V) and (XIII);
wherein:

p is equal to m; and

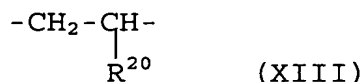
20 r is equal to one or more of m-1, m, and m+1.

9. The olefin copolymer as recited in claim 8, which is derived from the polymerization of a monomer component comprising ethylene and one or more dienes of the formula
25 $\text{H}_2\text{C}=\text{CH}(\text{CH}_2)_n\text{CH}=\text{CHR}^{19}$, wherein R¹⁹ is hydrogen or methyl, and n is 1, 2, 3 or 4.

10. The olefin copolymer as recited in claim 8,
further comprising one or both of the repeat units



and



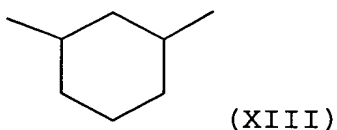
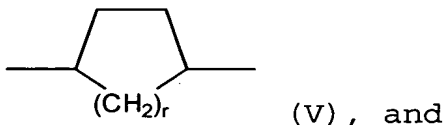
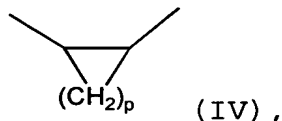
wherein $m1$ is 0 or an integer of from 5 to 28, and R^{20} is an n-alkyl containing 1 to 18 carbon atoms.

11. The polymer as recited in claim 8, which is
substantially non-crosslinked.

12. A substantially non-crosslinked copolymer of
ethylene and a diene of the formula $\text{H}_2\text{C=CH}(\text{CH}_2)_n\text{CH=CHR}^{19}$,
wherein R^{19} is hydrogen or an n-alkyl containing 1 to 18
carbon atoms, and n is 0 or an integer of 1 to 28,
containing residual unsaturation derived from the diene
monomer.

13. The copolymer as recited in claim 12, wherein R^{19}
is hydrogen.

14. The copolymer as recited in claim 12, containing
one or more of the repeat units



wherein p is 2, 3 or 4; and r is 0, 1, 2, 3, 4, or 5.